

PHILOSOPHY AND THE TWO CULTURES

by A. Cornelius Benjamin

No one who has scanned nonfictional books and periodicals in the last four or five years can, I think, fail to be impressed with the increasingly frequent appearance of the phrase "the two cultures." The expression is not restricted to literary journals, where it would seem quite appropriate, but is found in scientific articles, book publishers' lists, college catalogues, and is mentioned with great frequency in commencement addresses. It is always in quotes, of course, since it is well known to have been created by Sir Charles P. Snow in his Rede Lecture, *The Two Cultures and the Scientific Revolution*,¹ given at Cambridge University in 1959. One naturally assumes that those who quote the phrase know what Snow had in mind when he employed it, though the context in which they use it often indicates confusion, and sometimes complete ignorance, as to what he presumably meant. That this misunderstanding is not completely without justification I shall attempt to show in the following paper, since I am convinced that while Snow was wrestling with a genuine problem, he was not at all clear in his own mind either as to what the problem was or how it was to be solved.

According to precedent, the lecture was published in England as a paper-covered pamphlet the day after it was given. There were few reviews, some editorial comments, and short excerpts which were published in *Encounter*. Snow received some interesting private letters, but on the whole the lecture attracted little immediate attention. However, according to Snow's own report,² by the time a year had passed, articles, references, letters, and comments began to appear in great numbers from all parts of the world. Some of these were commendatory, some personally abusive, some of them stupid, and one essay was so critical that it almost resulted in a law suit.³ When the volume of comment finally became formidable, Snow decided to take action and attempt to clarify his original point of view. His severest critics had objected to the word "culture"; many were unhappy with the number "two"; no one, he says, complained about the definite article. (I propose to criticize all three.) He resolved, therefore, to republish in a single volume the original lecture as given, his reactions to some of the criticisms of this

material, and a general restatement of his position, admitting certain errors, omissions, and misleading emphases in his first formulation; but defending substantially the point of view he had taken at the outset. The result was the publication of the book mentioned in the footnote above, *The Two Cultures: and A Second Look*.⁴

I

I shall begin by summarizing, I hope not too unfairly, what I understand to be his problem. There have been so many misleading statements of his position that I hesitate to venture still another. But he at least took his start from the distinction, well recognized by educators and the general public alike, between a technical and a liberal education, and tried to account for, and perhaps eliminate, the hostility so often exhibited between the two groups of people who have had the respective modes of training. Sir Eric Ashby calls it the conflict between two powerful social forces—"the influence of the utilitarians and the cult of the practical man on the one hand, and the influence of the classical humanist and the cult of the scholar-gentleman on the other."⁵ While this is partly correct I think it is not an accurate statement of Snow's position. The honorific aspect of the words "scholar-gentleman" would probably receive his unqualified approval, but the derogatory suggestion of the words "practical" and "utilitarian" would seem inappropriate when applied to many scientists as Snow would characterize them and even as most people would describe them today. Snow's problem was that in advanced Western society educated people (I shall use this somewhat vague term for the present) are becoming sharply divided into two groups who have so little in common intellectually that they can scarcely converse with each other. This division among men of knowledge is not only increasingly disturbing to our normal social life—such as carrying on an intelligent conversation at a dinner party where representatives of both groups are present—but, what is much more important, it makes planning for the future of our civilization impossible. For the solutions of the social, political, and moral issues before us are now seen to be increasingly dependent not on the one group *or* the other, but on some sort of cooperative action between the two. A method must be found, therefore, for dispelling the antagonism between the groups, informing the ignorant in each group of what is well known in the other, and establishing a method for bridging the gap between them. Only in this way can enlightened choices be made concerning the kind of society in which we hope our children may live.

The response to Snow's original lecture, slow though it was in appearing, convinced the author of two things. In the first place, "if a

nerve had been touched almost simultaneously in different intellectual societies, in different parts of the world, the ideas which produced the response couldn't possibly be original. Original ideas do not carry at that speed. . . . The ideas were in the air. Anyone, anywhere, had only to choose a form of words. Then—click, the trigger was pressed."⁶ In the second place, Snow was convinced that there must be something in the ideas. This does not mean that they are necessarily right or could not have been expressed in different forms, but that "contained in them or hidden beneath them, there is something which people all over the world suspect to be relevant to present actions."⁷

This, then, was Snow's problem. First, to acquaint the general public with the existence of these sharply differentiated groups of educated people lacking a common vocabulary and a common subject matter, who have long recognized their status but have done nothing about it. Snow hoped to gain this end by finding appropriate words to characterize each of the groups, and thus to clarify the difference which separates them. Second, to show that the future of society can be shaped only by cooperative efforts on the part of these semi-hostile groups. This conflict, he argues, is not new but is part of the *Zeitgeist*, and its transparency is recognized as soon as people are made aware of it.

II

There seems to be no doubt whatsoever, at least in Snow's mind, as to who the people are who constitute one division of this educated group. They are the natural scientists, particularly the physical scientists. Snow is himself a physicist, has pursued research at Cambridge University for many years, and was scientific adviser for the British Government during the war. As to the other group, Snow never makes himself clear; he calls them the "literary intellectuals." Since Snow is not only a physicist but a novelist of some repute, having written, according to the last report, nine novels, which have sold moderately well, there is some reason to suppose that he is really using himself as a pattern for bifurcating the educated public into a scientific part which corresponds to his technical interests, and a literary part which represents his creative writing capacities and his frequent references to the current world of fiction.

In spite of Snow's elaborate explanation of why he chose the phrase, "the two cultures," to describe these two groups, I think his decision was most unfortunate. Offhand I cannot think of a single word in the area of his general problem which is so wrought with ambiguity and vagueness as the word "culture."⁸ Even small dictionaries give six or seven definitions of the term. If we exclude some of the technical uses, such as tillage of the soil, the cultivation of a particular crop, e.g.,

oyster culture, and the biological growth of bacteria in a nutrient medium, we are left with two definitions, both of which Snow considers to be involved in his notion.

According to the first of these, culture is "intellectual development, development of the mind."⁹ Snow admits that this definition has often carried overtones of a deep and ambiguous sort, and there is an aspect of "refinement," not clearly expressed in the definition, which leads us when we ask who is cultured to find that the needle points by an extraordinary coincidence to ourselves. This aspect of the definition I wish to disregard for the moment, since I hope to return to it later. But to define culture as intellectual development cannot possibly serve any useful purpose in distinguishing his two forms of culture, since we have already characterized both groups as educated people, and what we need is some way of distinguishing not the *manner* of their education but the *content*.

Snow's second definition of culture is the commonly accepted anthropological one: "a group of persons living in the same environment, linked by common habits, common assumptions, a common way of life."¹⁰ This description seems to me to be even less illuminating as a basis for distinguishing his two groups of intellectuals. To establish the fact that physical scientists exhibit a common culture in this sense would be extremely difficult, and, fortunately for the reader, I shall not make the attempt.¹¹ Of course they use generally the same methods and make the same presuppositions in carrying on their studies—this goes without saying, and is true for the literary intellectuals as well. But I see no evidence that either scientists or literary intellectuals have a distinctive cultural environment or a distinctive philosophy of life. In fact the cold war has done something to science which would have seemed impossible thirty years ago—it has developed a geography of science. Prior to this time science had been an outstanding example of an international, interracial, intersectorian enterprise—a cooperative institution on a worldwide basis. To the extent to which the cultures making up this institution became fragmented, differently constituted, and at odds with one another cooperation ceased; cultural similarities in scientific interests were not strong enough to prevent the divisive influences of ideological disagreements. So, too, in the case of the literary intellectuals. Scientists do not have a distinctive culture, nor do literary intellectuals. I do not see, therefore, how Snow can use the anthropological meaning of the term "culture" to differentiate his two groups on the basis of their respective patterns of living.

What Snow wanted, I believe, and what is contained in still another definition of "culture" is that aspect of "refinement" to which reference was made above. Snow does not give such a definition in either of his

essays, though he could have found one in Webster. But he does make a subtle reference to it in a brief article, "The Two Cultures," published three years before the Rede lecture.¹² Here he quotes the mathematician G. H. Hardy: "It is odd," says Hardy, "that when we hear about the intellectuals nowadays it doesn't include people like me and J. J. Thomsom and Rutherford." "¹³ And Snow would probably add, "Nor does it include me in my capacity as a physicist." Snow and the other scientists were irked by the fact that according to the prevailing conception only literary men are intellectual. The Oxford dictionary defines a liberal education as an education fit for a gentleman. Yet this irritation at being excluded from the intelligentsia manifested itself in a strange way. For in this same article in *The New Statesman and Nation* Snow points out that the scientific culture views with indifference all philosophy, but especially metaphysics. The philosopher whom he has in mind is Samuel Alexander, and this time it is Rutherford speaking: "When you think about all of the years you have been talking about these things, Alexander, what does it amount to? *Hot air*, nothing but *hot air*!" "¹⁴ This, says Snow, is the opinion of contemporary scientists. They regard it as a major intellectual virtue to know what not to think about. But the embarrassment arises from the fact that Alexander, by no stretch of the imagination, could be called a scientist; nor was he a literary intellectual as Snow defines the term. Yet, as I indicated above, Snow is extremely vague in his definition of this latter group, and if there are to be only two cultures Alexander would certainly be more closely allied to the literary group than to the scientists. But why should the scientists want to be identified with the intellectuals if their products are frequently nothing but hot air? Presumably the scientists have only two choices: either to be intellectuals and find that they often have very undesirable bedfellows, or to be nonintellectuals and discover that they are then classified not as gentlemen, but as gadgeteers and pebble-pickers.

Thus Snow appeared to be unable to find a definition of culture which would place the scientists among the social elite, and hence would guarantee that element of "refinement" and prestige to which he made previous reference. The fact that Webster defines the term in one place as "the enlightenment and refinement of taste acquired by intellectual and aesthetic training"¹⁵ does not seem to satisfy Snow in spite of his presumed knowledge of the musical competence of a Teller or an Einstein, and his awareness of the deep appreciation of music exhibited by many scientists. These appeared to him to be isolated cases, and he wonders how much of the traditional (literary) culture gets through to scientists in general,¹⁶ and to what degree the interests of scientists often extend into the area of religious, moral, political, legal, and humanitar-

ian values. He is forced to the conclusion that although scientists might have high competence in matters of social policy, they are not generally recognized as authorities in this area and are rarely consulted when questions of value come up for decision.

That Snow finally solved his problem by a bit of skillful linguistic legerdemain would, perhaps, be too severe a criticism. But that he *apparently* solved it to the satisfaction of most people by the introduction of the weasel word "culture" hardly seems deniable. In Jacques Barzun's review¹⁷ of Aldous Huxley's last book he states that the phrase "the two cultures" has become a "too successful cliché"; it apparently solves many problems but really solves none. In fact if some of its pre-suppositions are accepted it actually prevents the essential difficulty from being met. I shall argue, therefore, that Snow, by defining science in an unnecessarily restrictive way, and by defining the literary intellectuals so amorphously as to leave the reader completely in the dark as to whom they include has confused the issue rather than clarified it. Let me list, first, the errors which Snow himself discovered in his first formulation of the problem, when he reexamined it in his "second look."

III

Among the most important of the mistakes which Snow hastens to correct in the second essay is his original restriction of the number of cultures to *two*. His thinking on this problem can best be explained in his own words taken from the first lecture:

The number 2 is a very dangerous number: that is why the dialectic is a dangerous process. Attempts to divide anything into two ought to be regarded with much suspicion. I have thought a long time about going in for further refinements: but in the end I have decided against. I was searching for something a little more than a dashing metaphor, a good deal less than a cultural map: and for these purposes the two cultures is about right, and subtilizing any more would bring more disadvantages than it is worth.¹⁸

It is here, I believe, that Snow committed his greatest error: the important but highly complicated problem which he was considering cannot be solved by a "dashing metaphor." Metaphors solve nothing: they frequently illuminate; they often confuse; and by the looseness of their terminology they suggest quite different interpretations of the issue being considered. On the other hand, "cultural maps" *do* involve subtilizing. As we have already seen, the word "culture" demands precise definition before it can function as a clarifying term in the problem, and as we shall see in a minute the word "two" proves to have been a positive error. The result is that in order to solve his problem Snow will have to subtilize about the term "literary intellectual"; about the

difference between pure and applied sciences; about the problem of human values—and he will find himself, in spite of his wishes, deep in the intricacies of philosophy. It seems obvious to me that the worldwide controversy which was generated by his first lecture was due to the fact that he chose to solve his problem by a dashing metaphor which lent itself to so many varied interpretations that his critics insisted on a more analytic approach, in spite of the subtleties which this would necessarily involve. His commentators were not surprised at his disclosure of a complex problem of social control which was urgently in need of solution; they knew that this problem existed and that it was the result of the rapid growth of science, particularly in its increasingly practical role. But they also recognized the magnitude of the problem, and were genuinely disturbed that a glib phrase could be proposed to slay, at one blow, such a huge monster.

In Snow's second account he explains why he divided his educated group into *two* cultures:

I think . . . that writing as an Englishman made me insensitive to something which may, within a few years, propel the argument in another direction or which conceivably may already have started to do just that. I have been increasingly impressed by a body of intellectual opinion, forming itself, without any kind of lead or conscious direction, under the surface of this debate. . . . This body of opinion seems to come from intellectual persons in a variety of fields—social-history, sociology, demography, political science, economics, governments (in the American academic sense), psychology, medicine, and social arts such as architecture. It seems a mixed bag: but there is an inner consistency. All of them are concerned with how human beings are living or have lived—and concerned, not in terms of legend, but in terms of fact. I am not implying that they agree with each other, but in their approach to cardinal problems—such as the human effects of the scientific revolution, which is the fighting point of this whole affair—they display, at least, a family resemblance.

I ought, I see now, to have expected this. I haven't much excuse for not doing so. I have been in close intellectual contact with social historians most of my life: they have influenced me a good deal: their recent researches were the basis for a good many of my statements. But nevertheless I was slow to observe the development of what, in terms of our formula, is becoming something like a third culture.¹⁹

While this has not commonly been called a "culture" in this country, it has long been recognized as a legitimate study in spite of some of the dubious subjects, such as medicine and architecture, which are included by Snow but do not quite fit into our pattern. I happen to prefer the term "behavioral" to "social" to characterize these studies, but this is a matter of no great import. Now I do not propose to involve myself at this point in the issue of scientism, i.e., whether the methods of the natural sciences are applicable to the behavioral sciences with sufficient success to warrant the latter being included in the sciences in

the basic sense. But Snow's pronouncement clearly indicates that in his initial attempt to bifurcate the world he felt either that the natural sciences were the only sciences, or that human, preferential behavior did not constitute an element of experience which had enough importance to be classified among the basic cultures. This omission I think was a serious one, but he deserves credit in his "second look" for recognizing that the behavioral studies might be at least an embryonic third type of culture, whether scientific or nonscientific.

He explains both his overemphasis on the sharpness of the division into two cultures and his failure to recognize a possible third culture by saying that he was speaking as an Englishman, educated in England, and that he was strongly influenced by continental education, particularly German. In both systems the student, usually early in his career, makes a choice between a technical education and a literary one, which never overlap, and which leave him consequently blind to half of what constitutes the intellectual competence of the truly educated man.²⁰ However, in America Snow discovers, apparently to his amazement, not only that many students are exposed to both cultures but that in technological schools, whose curricula would presumably be largely centered on sciences in general, and on practical sciences in particular, extensive opportunities are given to all students to pursue education in humanities, literature, and philosophy. Indeed, in at least one technological school²¹ a full doctorate program is now offered, which is designed precisely to bridge the two cultures. Thus, in the United States the break between the two forms is not so sharp as he had led his readers to suppose. Students are not only given opportunities but actually urged to adopt curricula whose precise goal is to eliminate the situation which Snow is deploring.

Snow's third modification in his original point of view is not in the reference to a further distinction but in the apparent abandonment of one which had seemed essential when he first defined the two cultures—that between pure and applied science. He introduced this by suggesting that there is a very important difference between an industrial revolution and a scientific revolution. Part of the social crisis today lies in the fact that the old mechanical science, which determined the industrial revolution of the eighteenth century, is so different from today's electronics, atomic energy, and automation, that we have no way of predicting what kind of technological revolution the newer science will produce. But in Snow's second thoughts he seems to suggest abandoning entirely the distinction between pure science and technology, at least as a difference between two kinds of science. His grounds for this rejection lie in the practical difficulty in deciding whether any particular ex-

ample of scientific investigation is pure or applied. In this possibility of confusing a given case I should certainly agree with him.

But that the fundamental distinction between them exists, and even remains in his own mind, is clear from the following quotation: "The scientific process has two motives: one is to understand the natural world, the other is to control it. Either of these motives may be dominant in any individual scientist; fields of science may draw their original impulses from one or the other."²² Pure science, in other words, is the pursuit of truth concerning the structure and operation of the world with no regard whatsoever for the use to which this knowledge is to be put in the way of making men happier or the world better; it is the satisfaction of an intellectual curiosity and is much like solving crossword puzzles except that its problems are posed by nature and not by man. Applied science is the modification of the world toward the attainment of our goals and ideals.

But while this both defines and justifies the distinction between pure and applied science it does not remove the ambiguity in the term "applied science." What we should *like* to say is that there remains the distinction between the "pure" applied scientist and the "applied" applied scientist. Does the applied scientist actually change the world as a result of his knowledge of pure science, or does he merely show us how this can be done in case it is so desired? Unfortunately the term "applied scientist" has come to be used to describe both the scientist who indulges in applied research, but who makes no changes whatsoever in the world, and the artisan, the practitioner, and even the professional man, who actually manipulate nature by introducing the instruments which will create the desired ends. Unless this distinction is maintained we shall continually confuse engineering schools with manufacturing companies, schools of business and public administration with business enterprises, and medical schools with medical clinics. The distinction is very important because the solution to the problem of the social responsibilities of the scientist rests upon it. But into this question I cannot go at this point.

Snow is certainly to be criticized for not making abundantly clear whether he does or does not accept this basic distinction. But what is of more concern is his failure to recognize that the terms "applied science" and its equivalent, "technology," are both subject to a serious ambiguity. If I might be allowed, for the moment, to speak in an oversimplified language, I should say that pure science attempts to discover causal relations between events in the world. Now a pure science becomes an applied science by a very simple transformation: if the effect is something which does not exist at a certain time and place but we should *like* to have it exist, then we employ the cause as an instrument

(provided it is under our control) by which we create the desired effect. Thus cause-and-effect relations in pure science become means-end relations in applied science, and what determines the transformation is the fact that something which does not exist is desired by man. The notion of applied science is meaningless apart from the notion of value.

In summary, I have shown that Snow tried to raise the prestige of scientists by calling them "cultured." In order to do this he had to define by a dashing metaphor a new culture—a scientific culture—which proved to be confusing since it became contrasted with an English and continental culture much more narrowly conceived than the broad, humanistic culture of our American colleges and universities. Then, almost by accident, he discovered a culture which he had previously overlooked—the behavioral sciences. Finally, although his main problem was to determine the social role of the scientist, he equivocated on the distinction between the pure and applied sciences.

I am of the opinion that the real source of Snow's confusion is his failure to recognize that the problem which he has undertaken to solve is a philosophical one. So far as I can detect after several readings of Snow's serious writings he mentions the word "philosophy" in the derogatory context above, where he refers to Rutherford's comment on Alexander's writing, but rarely elsewhere, and then in settings which are merely incidental. However, according to almost any of the traditional conceptions of philosophy what Snow is doing *is* philosophy. He is examining the universe and trying to discover "parts," which he wants to call "cultures," and which he wishes to interrelate into a whole. Many would agree that this is what Snow is doing, and that the results are, indeed, "hot air." If this is true the most expedient solution would be not to wait for Snow to take a "third look" at the problem, but to advise him to abandon the two cultures completely and start again from the beginning, this time philosophically. I am afraid such a suggestion is too late. Barzun was obviously right in saying that the phrase "the two cultures" has become a too successful cliché; people are going to continue to use it in spite of anything we can now do. This is discouraging, for the problem which Snow has raised is not only complicated but urgently in need of a solution. As he says, the widespread reaction to his thesis clearly indicates that the ideas contained in it are considered by people all over the world to be relevant to the present social situation. It is a pity, therefore, that we must first undo all that Snow has done before we can face the problem in an unprejudiced manner.

What general conclusions can we draw? Snow has grossly oversimplified the problem, and some further explorations and careful analyses will be required in order to resolve some of the resulting difficulties.

Snow is prone to metaphorical thinking: the literary intellectuals represent a culture; so also, by a broadening meaning of the word, do the scientists. The behavioral scientists, newly discovered by Snow, exhibit many common interests and methods; let us also give them the status of a culture. And even on the negative side the vagueness of the cultural metaphor prevents him from making up his mind as to whether the pure sciences are culturally different from the applied. And, finally, philosophy is denied cultural status simply because Snow does not realize that when cultures are defined, there is the further cultural task of integrating them into a unified whole.

But because of these confusions in Snow's thought, there are many misleading interpretations of his position. For example, many of those who adopt the "two culture" phraseology clearly suppose him to have set up a fact-value dichotomy: to scientists is assigned the study of facts; to humanists the study of values. I do not think that this was Snow's intention, in spite of the fact that it offers him certain advantages in his use of the cultural metaphor. It tends to destroy the social superiority of the humanists over the scientists, so much resented by the latter group. For valued objects are clearly objects—be they the abstractions of logic and mathematics, mass-energy, life, or human behavior—and these lie in the field of the sciences if the area is given proper breadth. Another advantage is the fact that the scientist can see his subject matter as not completely value-free, but as a value potential. Every fact is a value possibility—even if only to be known, to be painted, to be the subject of a poem, or to be the object of religious worship. Thus the scientist is in a position to provide the humanist with material for embellishing life and emphasizing its characteristically valuational aspects. Snow seems to be rightly disturbed by our failure to create individuals who can be, so to speak, doubly cultured in the sense that they always see the interrelationships of facts and values. But if his initial examination of the world had been less hasty, less tied up with unfortunate terminology, less prejudiced by nationalistic points of view, and more empirical in its approach, he would have discovered that facts and values are integral parts of our total culture, interrelated in a very complicated map, and that he has separated them only through a vicious abstraction which will plague him to the end of his days.

IV

Anyone who is to solve the problem which Snow has set up must first realize that his task is, indeed, a philosophical one, and must be undertaken with full knowledge of the scope and complexities of the enterprise. As we have abundantly seen, a dashing metaphor will not work: a detailed map of the universe is required. Metaphors are crude and

suggestive rather than straightforward; maps have not only precise boundaries but they locate areas in their relations one to another.

One finds it difficult to understand why Snow, who realizes that the problem can be solved only by better education, refuses to recognize that our schools, particularly our universities, have from their inception provided us with highly accurate maps of the universe, reflecting not only man's aims and ideals but his accomplishments and findings as well. He says, in fact, that we can do something about the problem. "The chief means open to us is education—education mainly in the primary and secondary schools, but also in colleges and universities. There is no excuse for letting another generation be as vastly ignorant, or as devoid of understanding and sympathy, as we ourselves."²³ Why, then, should we not turn to our universities for light? The great diversity exhibited in the curricula of our institutions of higher learning should cause us neither to lose faith in their reliability as indicators of what there is in the universe that is worth examining, nor to despair because of the complexity of the problem to be solved. Snow has more or less unconsciously uncovered important areas of study, but he has misnamed them and confused their interrelationships.

In this concluding section I shall venture to list the main fields of inquiry to which we must turn for the solution to the problem of social control and related issues. I shall not use the word "culture" to designate these areas, for reasons which I hope have been made clear in the preceding pages. For the same reason I shall not speak of the cultivation of these areas, but shall use the accepted academic word "disciplines" to designate scholarly investigations into these fields of inquiry. Our task, then, is to produce a pattern of the most general areas of the universe, and a corresponding map of the disciplines by which these areas are to be investigated.

Outstanding among these fields are the sciences as disciplines and their corresponding fields of exploration as subject matter. The recent revolution in mathematics (to which Snow, strangely enough, makes no reference) demands, I think, that we distinguish sharply the natural sciences (biological and physical) from pure mathematics and logic. Similarly I believe that we must, in spite of Snow's reluctance to do so, admit the behavioral sciences into the field of the sciences; certainly they share methods with the natural sciences, yet exhibit their own peculiarities just as mathematical logic both resembles and differs from the natural sciences.

But the sciences are not just sciences—they are pure or applied. Now this distinction is not only in method but subject matter as well. Both the logico-mathematical and the natural sciences are value-free (except insofar as truth itself is a value), but so also are the behavioral

sciences, which study values as objective manifestations of preferential behavior. As was suggested above, pure science becomes applied science when effects are seen as ends and causes are interpreted as means. This is true in mathematics, physics, and biology, but it is no less true in the behavioral sciences. Pure behavioral sciences describe existing modes of valuational behavior, and are thus not normative sciences except in the sense that they portray the prevailing norms of a given society. Applied behavioral sciences in their simplest form tell us how to find the instruments by means of which society may be bettered; they thus deal with instrumental values primarily, not with final values. The full-blown applied behavioral sciences are policy-making sciences and attempt to determine the ultimate goals of human living in the many areas of our experience.

However, the field of the applied scientist, whether mathematical logician, naturalist, or sociologist, is not to be confused with that of the special worker—the artisan, the laborer, the technician, the businessman, the agriculturist, the doctor, the lawyer, even the teacher—whose task is to put means to work in order to produce the desired ends, once they have been approved by the social group. Thus we have created a new “culture”—the manipulators—who by skill and knowledge actually transform the world (hopefully) into a better place to live, in which there will be a greater abundance of health, wealth, knowledge, piety, morality, and beauty. Some of these manipulators engage in these activities as trades and professions, by which they earn a living; others pursue them simply as avocations or as instruments for the production of a fuller life—a life which, without them, would be ill, poor, ignorant, sinful, immoral, and surrounded by ugliness.

Among the disciplines which a philosophical map of the universe discloses, perhaps the hardest to distinguish one from the other are the behavioral sciences and the humanities. Snow discovered the former only after a second look; he defined the latter in terms of the “literary intellectuals,” and we found that he was quite unclear as to whom this included. He refers most often to men like himself, who are novelists and literary critics. But he obviously means to include a group which is much wider in scope—all those who deal with the basic human values of truth, beauty, morality, piety, law and government, education, health, recreation, and all of the goals which contribute to the well-being of mankind. The problem is that both the behavioral sciences and what are commonly called the “humanities” deal with precisely these same values. How, then, are they to be distinguished?

Since this is a highly controversial issue and many methods for distinguishing the two have been offered in the history of thought, I shall state my view dogmatically.²⁴ I find it convenient to define

the humanities as the meta-behavioral sciences. (The term "meta-science" has come into our vocabulary recently largely through the study of language. When we study a language we must be careful not to confuse the language which we are studying with the language by means of which we are studying it; the latter is commonly called a "meta-language.") Transferring the terminology, we may speak of certain disciplines as studies of sciences in much the same way that the sciences are studies of their own subject matter. Then meta-sociology (often called "social philosophy") will be one of the humanities; so also will be meta-economics, meta-political science, meta-education, and meta-psychology. The danger in this terminology is that a meta-science will be judged to be essentially the same kind of discipline as the science it studies. Nothing could be further from the truth. Meta-sciences are characterized by the fact that they examine the methods and presuppositions of the sciences which they study; they bring to light the assumptions; they clarify and validate the methods; and they evaluate the goals. Their methods may or may not be like the methods of the "lower level" sciences; usually they are quite different. C. D. Broad calls such studies "critical philosophy," and if he is correct all of the humanities are to this degree philosophical. Whether a study of any mode of behavior is one of the sciences or one of the humanities will depend upon the degree of critical analysis which is employed; this is difficult to decide in any case, but no more of a problem than it has been in the past when we have attempted to distinguish sociology from social philosophy, political science from political philosophy, or any other behavioral science from the examination of its methods and presuppositions.

Thus far we have seen that our map of the universe must contain abstractions, which are studied by mathematical logic; mass energy, which is studied by the physical sciences; life, which is studied by the biological sciences; and human valuational behavior, which is studied by the behavioral sciences. Furthermore, we have seen that each of these sciences may be pure or applied. And we have discovered that each applied science is potentially put to work to improve man's life on earth—a fact which generates a new category of "manipulators." These are roughly divided into two groups, not sharply differentiated from each other. On the one hand are those who make up the trades and professions; they pursue these activities as lifework. On the other hand, there are those of us who may or may not earn our living by these activities, but carry them on nevertheless either as avocations or attempts to fill out our individual lives in order to realize our full potentialities as human beings. Finally, there are the humanities or meta-sciences, whose subject matter and whose methods are quite different from any of those thus far considered. This, then, is our list

of disciplines: mathematical logic, natural science (physical and biological), behavioral science, pure science, applied science, trades and occupations (which are not disciplines in the strict sense), and meta-science. But this is not all.

For what I have just done is to draw a map of the universe, and such activity is not contained in any of the categories listed above. This is the task of the philosopher *par excellence*. Snow did not consider it important because he felt that it would lead to unnecessary subtleties. If these are all "cultures," then there are nine "cultures," not two. And the problems of the interrelations between them—which was his main consideration—are tremendously more complex than he had supposed. I have merely *listed* the disciplines; the task of *uncovering their complex interrelationships* is forbidding in its scope and intricacy. The purpose of this paper has been to discourage Snow from taking a third look. Without a map he will only sink deeper into the quagmires of "cultures."

NOTES

1. In the United States the lecture was published in hard covers (New York, 1959).
2. C. P. Snow, *The Two Cultures: and A Second Look* (Cambridge, England, 1964), p. 54.
3. *Ibid.*, p. 57. The work referred to was F. R. Leavis's *Two Cultures? The Significance of C. P. Snow* (first published, *Spectator* [March 9, 1962]; republished in hard covers, London, 1962).
4. Since the original essay is contained in this volume, I shall use its pagination for references to both essays, using the title, *Second Look*.
5. *Technology and the Academics* (New York, N.Y., 1959), p. 59.
6. *Second Look*, p. 54.
7. *Ibid.*, p. 55.
8. A striking example of the complex problems which arise in the use of this word is to be found in "Daedalus: Science and Culture," *Journal of the American Academy of Arts and Sciences* (Winter, 1965).
9. *Ibid.*, p. 62.
10. *Ibid.*, p. 64.
11. An attempt on the part of D. C. Beardslee and D. D. O'Dowd in an article entitled, "The College Student Image of the Scientist" (*Science*, CXXXIII, No. 3457, 997-1001), to determine the characteristic cultural traits of the scientist drew the conclusion, somewhat surprising in character, that scientists generally have unattractive wives.
12. *The New Statesman and Nation* (Oct. 6, 1956), 413-14.
13. *Ibid.*, p. 413.
14. *Ibid.*, p. 413.
15. *Webster's Collegiate Dictionary*, 1958 ed.
16. *Loc. cit.*, p. 413.
17. *Science*, CXLIII, No. 3601, 33.
18. *Second Look*, p. 65.
19. *Ibid.*, pp. 69-70.

20. Sir Eric Ashby (*op. cit.*) points out that this is much less true today (1959) than it was formerly.
21. Case Institute of Technology.
22. In at least two of Snow's earlier writings he emphasized the distinction strongly. See "The Enjoyment of Science", *Spectator*, CLVI (June 12, 1936), 1074-1075; and "What We Need from Applied Science," *Spectator*, CLVII (Nov. 20, 1936), 904.
23. *Second Look*, p. 61.
24. See A. Cornelius Benjamin, *Science, Technology and Human Values* (Columbia, Missouri, 1965).